

CLAIMS

1. Device for controlling the temperature of fluids circulating in a heat engine (12) vehicle, of the type comprising a circuit (10) in which a heat-transfer liquid circulates for cooling the heat engine (12) and at least one heat-transfer liquid / fluid to be regulated heat exchanger (14, 16), **characterized in that** it is intended to control the temperature of first and second fluids formed by lubricating oil of the heat engine of the vehicle and by recirculated exhaust gases, respectively, and in that it comprises:

- a first heat-transfer liquid / lubricating oil exchanger (14),
- a second heat-transfer liquid / recirculated exhaust gases exchanger (16),

the first and second exchangers (14, 16) being connected to a same heat-transfer liquid circuit (10).

2. Device for controlling the temperature of fluids according to claim 1, wherein the heat-transfer liquid circuit (10) is connected to a heat source or to a heat sink (18).

3. Device for controlling the temperature of fluids according to claim 2, wherein the heat source or the heat sink (18) comprises heat storage means (18) that can exchange heat with the heat-transfer liquid, in particular during a heating mode, in which the heat from the storage means (18) is transferred to the heat-transfer liquid, and during a regeneration mode, in which the heat from the heat-transfer liquid is transferred to the storage means (18).

4. Device for controlling the temperature of fluids according to claim 3, wherein the heat storage means (18) comprise a chemical compound that stores or releases heat energy by changing phases.

5. Device for controlling the temperature of fluids according to any of claims 2 to 4, wherein the two exchangers (14, 16) and the heat source or the heat sink (18) are connected in series in the heat-transfer liquid circuit (10), in the order: heat source or heat sink, heat-transfer liquid / oil exchanger (14), heat-transfer liquid / recirculated exhaust gases exchanger (16), considering the direction of circulation of the heat-transfer liquid in the circuit (10).

6. Device for controlling the temperature of fluids according to any of claims 1 to 5, wherein the heat-transfer liquid circuit (10) comprises derivation means (23) from the heat-transfer liquid / oil exchanger (14).

7. Device for controlling the temperature of fluids according to claim 6, wherein the derivation means (23) from the heat-transfer liquid / oil exchanger (14) comprise a derivation branch (24) from the heat-transfer liquid / oil exchanger (14) and a three-way valve (26A) comprising first and second channels of the same signs connected, one to the exchanger (14), and the other, to the derivation branch (24) from the heat-transfer liquid / oil exchanger (14), and a third channel of the sign opposed to that of the former connected to the circuit (10).

8. Device for controlling the temperature of fluids according to claim 6, wherein the derivation means (23) from the heat-transfer liquid / oil exchanger (14) comprise a four-way valve (26B) comprising two channels of opposed signs connected to the heat-transfer liquid / oil exchanger (14) and two channels of opposed signs connected to the heat-transfer liquid circuit (10).

9. Device for controlling the temperature of fluids according to any of claims 2 to 8, wherein the heat-transfer liquid circuit (10) comprises derivation means (27) from the heat source or from the heat sink (18).

10. Device for controlling the temperature of fluids according to claim 9, wherein the derivation means (27) from the heat source or from the heat sink (18) comprise a derivation branch (28) from the heat source or from the heat sink (18) and a three-way valve (30A) comprising first and second channels of the same signs connected, one to the heat source or to the heat sink (18), and the other, to the derivation branch (28) from the heat source or from the heat sink (18), and a third channel of the sign opposed to that of the former connected to the circuit (10).

11. Device for controlling the temperature of fluids according to claim 9, wherein the derivation means (27) from the heat source or from the heat sink (18) comprise a four-way valve (30B) comprising two channels of opposed signs connected to the heat source or to the heat sink (18) and two channels of opposed signs connected to the heat-transfer liquid circuit (10).

12. Device for controlling the temperature of fluids according to any of claims 1 to 11, wherein the heat-transfer liquid circuit (10) comprises derivation means (31) from the engine (12).

13. Device for controlling the temperature of fluids according to claim 12, wherein the derivation means (31) from the engine (12) comprise a derivation branch (32) from this engine (12) and a three-way valve (34A) comprising first and second channels of the same signs connected, one to the engine (12), and the other, to the derivation branch (32) of this engine (12), and a third channel of the sign opposed to that of the former connected to the circuit (10).

14. Device for controlling the temperature of fluids according to claim 12, wherein the derivation means from the engine (12) comprise a four-way valve (34B) comprising two

channels of opposed signs connected to the engine (12) and two channels of opposed signs connected to the circuit (10).

15 15. Device for controlling the temperature of fluids according to any of the preceding claims, wherein the heat-transfer liquid circuit (10) is connected additionally to heat exchange means (20) between the heat-transfer liquid and the air of a passenger compartment of the vehicle.

10 16. Device for controlling the temperature of fluids according to any of the preceding claims, wherein the heat-transfer liquid circuit is connected additionally to an electric pump (38) capable of circulating the heat-transfer liquid in at least a portion of the circuit (10), in particular when the engine (12) is off.

17. Method for controlling the temperature of fluids implemented by the device according to any of the preceding claims, **characterized in that** it comprises the following steps:

- 15 - raising the temperatures of the oil (TH) and of the heat-transfer liquid (TL) and determining whether the temperature of the oil (TH) is lower than a predetermined temperature (T) (first condition),
- if this first condition (40) is met, determining whether the temperature of the heat-transfer liquid (TL) is higher than the temperature of the oil (TH) (second condition),
 - 20 • If the second condition (42) is met, adjusting (44) the amounts of the heat-transfer liquid and of the oil circulating in the exchanger (14) so as to promote heating of the oil through heat exchange with the relatively hot heat-transfer liquid,

- If the second condition (42) is not met, adjusting the amounts of the heat-transfer liquid and of the oil circulating in the exchanger (14) so as to avoid or minimize the heat exchange between the oil and the relatively cold heat-transfer liquid,

- 5 - if the first condition (40) is not met, adjusting (44) the amounts of the heat-transfer liquid and of the oil circulating in the exchanger (14) so as to promote cooling of the oil.

18. Method for controlling the temperature of fluids implemented by the device according to claim 3, **characterized in that** it comprises circulating the heat-transfer liquid
10 both in the heat-transfer liquid / recirculated exhaust gases exchanger (16) and in the heat storage means (18), and this independently from the operation in heating mode or in regeneration mode of these storage means (18).

19. Method for controlling the temperature of fluids implemented by the device according to claims 3 and 15 taken together, **characterized in that** it comprises, the heat
15 storage means (18) being in regeneration mode and the engine (12) being on, adjusting the amount of the heat-transfer liquid circulating in the heat storage means (18) so as to avoid or minimize the heat exchange between the heat storage means (18) in the regeneration mode and the heat-transfer liquid.

20. Method for controlling the temperature of fluids implemented by the device according to claims 3 and 15 taken together, **characterized in that** it comprises, the heat
20 storage means (18) being in heating mode and the engine (12) being off or operating at idle speed after a period at a higher speed:

- if at least one condition among a first category of condition(s) is met, adjusting the amount of heat-transfer liquid circulating in the heat storage means (18) so as to avoid or minimize the heat exchange between the heat storage means in the heating mode and the heat-transfer liquid,

- 5 - if at least one condition among a second category of condition(s) is met, adjusting the amount of heat-transfer liquid circulating in the heat storage means (18) so as to promote heating of the heat-transfer liquid through heat exchange with these storage means (18).

21. Method for controlling the temperature of fluids according to claim 20, wherein
10 the first category of condition(s) comprises a voluntary order to turn off the engine (12) by a user.

22. Method for controlling the temperature of fluids according to claim 21, wherein
the second category of condition(s) comprises an order to turn off the engine (12) by a
computer of the vehicle, a triggering of emergency lights of the vehicle accompanying turn-
15 off of the engine (12), a dysfunction of the vehicle necessitating turn-off of the engine (12),
and an order to heat the air of the passenger compartment in anticipation of start-up of the
engine (12).